

JOHN NAIM HARB

OFFICE ADDRESS

Fulton College of Engineering and Technology
Brigham Young University
Provo, Utah 84602
(801) 422-4393
Email: john_harb@byu.edu

EDUCATION

Ph.D. in Chemical Engineering, February, 1988
University of Illinois, Champaign-Urbana, GPA: 5.0/5.0
M.S. in Chemical Engineering, December 1985
University of Illinois, Champaign-Urbana
B.S. in Chemical Engineering, August 1983
Brigham Young University, Provo, GPA: 3.97/4.0; Graduated *Summa Cum Laude*

Ph.D. Thesis: Experimental and Theoretical Investigation of Pitting Corrosion on Nickel in Chloride Solution

M.S. Thesis: The Effect of Flow on the Pitting Corrosion of Stainless Steel

RESEARCH INTERESTS

- Electrochemical Engineering, Batteries, Microbatteries, Nanofabrication and Devices;
- Engineering Education

HONORS AND ACTIVITIES

Brigham Young University
Outstanding ChE Faculty Member, 2/02

Brigham Young University
Faculty of Excellence Award, Phi Eta Sigma, 11/01

Brigham Young University
Recognized by Student Honor Association, 3/00

Brigham Young University
Outstanding Teacher in Chemical Engineering (student vote), 2/00

Brigham Young University
Most Helpful Professor in Chemical Engineering (student vote), 2/99

American Association for Engineering Education
Dow Outstanding New Faculty Award, 4/95

Blue Key National Honor Society
Professor of the Month, 1/93

International Business Machines Corporation
IBM Graduate Fellow, 8/85-5/86

Electrochemical Society
Edward G. Weston Summer Fellowship, 6/85-8/85

University of Illinois
Chemical Engineering Industrial Fellowships, 8/83-5/85, 8/86-2/88

Brigham Young University

Karl G. Maeser Scholarship in Engineering, 9/82-4/83

American Institute of Chemical Engineers

Outstanding Senior in Chemical Engineering, 9/82-4/83

Brigham Young University

Trustees Scholarship, 9/77-4/78, 9/80-4/82

Professional Societies

The Electrochemical Society, American Society for Engineering Education, Phi Kappa Phi

EXPERIENCE

Associate Dean

Brigham Young University, 5/05 to present

Professor

Brigham Young University, 9/99 to present

Associate Professor

Brigham Young University, 9/94-9/99

Assistant Professor

Brigham Young University, 3/88-8/94

Principal Investigator

Advanced Combustion Engineering Research Center,
Brigham Young University, 4/88-4/98

Visiting Scientist

Bipolar Technologies Corporation, 9/96-8/97

Research Fellow, Teaching Assistant, Research Assistant

University of Illinois, 8/83 to 2/88

Research Assistant

Brigham Young University, 4/82-7/83

CONSULTING

- TRW Corporation 3/93-12/93
- Precision Systems Engineering, 10/95-9/96
- Optima Batteries 9/97-8/98
- ABB Combustion Engineering, 7/96-12/96
- Bipolar Technologies Corporation, 7/94-12/99
- East Penn Manufacturing Company, 11/05-present

PATENTS

"Microscopic Batteries for MEMS Systems," R.M. LaFollette, L.G. Salmon and J.N. Harb, U.S. Patent No. 6,610,440, issued August 26, 2003, assigned to Bipolar Technologies

"Microscopic Batteries Integrated with MEMS Systems," R.M. LaFollette, L.G. Salmon and J.N. Harb, U.S. Patent No. 7,114,654, issued December 5, 2006, assigned to Bipolar Technologies

COURSES TAUGHT (excluding seminars, etc)

ChE 693R Electrochemical Engineering

ChE 381	Semiconductor Processing
ChE 476	Separation Processes
ChE 475/477	Unit Operations Lab
ChE 451	Process Design and Synthesis
ChE 436	Process Dynamics and Control
ChE 310	Energy and Fossil Fuels
ChE 273	Material and Energy Balances
ChE 263	Computation Tools for Chemical Engineering
ChE 170	Introduction to Chemical Engineering
ChE 101	Computer Applications in Chemical Engineering

RESEARCH FUNDING

J.N. Harb, R. Davis, M. Linford, D. Wheeler, and A. Woolley, "NIRT: Chemically Directed Surface Alignment and Wiring of Self-Assembled Nanoelectrical Circuits," National Science Foundation, 7/01/07 - 6/31/11, \$1,032,000 (includes REU Supplement and International Supplement) (PI).

N. Thakor and J.N. Harb, "Power Harvesting in Implanted Neural Probes," NIH (Subcontract from Johns Hopkins), 2/06 - 4/09, \$96,885 (Co-PI).

J.N. Harb and D.R. Wheeler, "Fundamental investigation of mixed-oxide cathodes for rapid-charge lithium-ion batteries," Office of Naval Research, 9/01/05 - 8/31/06, \$75,000 (PI).

J.N. Harb, D.R. Wheeler, and M.R. Linford, "SGER: Exploratory Methods for Nanowire Fabrication on Insulating Substrates," National Science Foundation, 3/05 - 2/07, \$112,000 (includes REU supplement) (PI).

M. Lee, A. Woolley and D. Tolley, "Electromobility Focusing for Separation of Proteins," NIH, 2/03 - 1/06, \$20,000/yr (Senior Investigator).

J. N. Harb, Grant to support education in microelectronics, Micron Foundation, 2003 - 2007, \$100,000 (PI).

J. N. Harb, Grant to support Micron Scholar summer research, Micron Foundation, 4/03 - 8/03, \$8000 (PI).

R.L. Rowley and J.N. Harb, "Molecular Simulations of the Interface and Double Layer for Model Copper Electrodeposition Effects of Organic Additives," National Science Foundation (SGER & International Supplement), 7/02 - 6/04, \$78,500 (Co-PI).

J.N. Harb, "Microbatteries for Use in a Micropower Supply Equipped with a Fuzzy Logic-Based Microcontroller," US Nanocorp, 1/31/02 - 12/31/02, \$35,000 (PI).

J. N. Harb, G.D. Watt and R.C. Davis, "Nanoscale Materials and Structures for Nano and Micropower Applications, NASA, 1/02 - 12/04, \$310,300 (PI).

D.R. Wheeler and J.N. Harb, "Design, optimization, and fabrication of high-performance electrodes for the next generation of Li-ion batteries," U.S. Dept. of Energy BATT Program, 9/01/04 - 3/31/09, \$680,809 (Co-PI).

J.N. Harb, "Evaluation and Optimization of Ni/Zn Microscopic Batteries for Powering Autonomous MEMS and Other Microsystems," U.S. Airforce (Phase I SBIR, subcontract from US Microbattery), 10/1/01 – 2/28/02, \$10,000 (PI).

B.L. Adams, J.S. Gardner, J.N. Harb, L.L. Howell, T.W. Nelson, "MRI: Acquisition of a High Resolution Scanning Electron Microscope for Materials Research at Brigham Young University," 8/01/00 to 7/31/01, \$255,000 (Co-PI).

J. N. Harb and L.L. Howell, "Micropower Supplies for Remote, Autonomous Microsystems," National Science Foundation XYZ on a Chip, 1/1/00 – 1/1/04, \$530,000 (includes REU supplement) (PI).

J. N. Harb, "Development of a Lead-Acid Battery Model for Use in Hybrid Vehicle Simulations," National Renewable Energy Laboratory, 6/98 to 4/99, \$49,494 (PI).

R.M. LaFollette, J.N. Harb, and L.G. Salmon, "Development of Microbatteries for MEMS Applications," Phase II SBIR, BMDO through Wright Patterson Air Force Base, \$750,000 (50% to Brigham Young University) (Co-PI).

R. M. LaFollette and J. N. Harb, "Investigation of Lithium Peroxide as the Positive Electrode Material for a Solid-State Thin-Film Secondary Lithium Battery," Bipolar Technologies Corporation, 7/94 to 8/95 (Subcontract), \$23,800 (Co-PI).

J. N. Harb, "Modeling of Ash Deposition in PC-Fired Boilers," Fellowship support for Ph.D. student, Combustion Engineering, Inc., 7/96 to 7/98, \$16,000 (PI).

J. N. Harb, "Investigation of Mineral Transformations and Ash Deposition During Staged Combustion," U.S. Department of Energy University Coal Research Program, 1993 to 1997, \$200,000 (PI).

C.H. Bartholomew, W.C. Hecker, J.N. Harb, D.J. Eatough, J.B. DuBow, "Mossbauer Spectrometer with Magnetic Resolution for Catalysis/Coal Mineral Research," National Science Foundation Equipment Grant, 1992, \$42,200 (Co-PI).

Douglas N. Bennion, John N. Harb, and William G. Pitt, "Electrochemical, Piezonuclear Fusion," Office of Naval Research/ SDIO, July 27, 1989, \$75,000 (Co-PI).

J. N. Harb, "The Behavior of Mineral Matter in Coal Combustion Systems," National Science Foundation through the Advanced Combustion Engineering Research Center, Brigham Young University and the University of Utah, 5/88 to 4/97, (renewed annually), total \$770,100 (PI).

J. N. Harb, "Corrosion in Coal Combustion Systems," National Science Foundation through the Advanced Combustion Engineering Research Center, Brigham Young University and the University of Utah, 5/88 to 4/89, \$5,420 (PI)

TEXTBOOK

- K.A. Solen and J.N. Harb, Introduction to Chemical Process Fundamentals and Design, McGraw Hill, 1996.
- K.A. Solen and J.N. Harb, Introduction to Chemical Process Fundamentals and Design, 2nd Edition, McGraw Hill, 1997.
- K.A. Solen and J.N. Harb, Introduction to Chemical Process Fundamentals and Design, 3rd Edition, McGraw Hill, 1998.
- K.A. Solen and J.N. Harb, Introduction to Chemical Process Fundamentals and Design, 4th Edition, McGraw Hill, 2005.

MONOGRAPHS/REPORTS

- J. N. Harb, P.K. Hurt, K.J., Williamson, R.E. Terry, "Teaching Through the Cycle- Application of Learning Style Theory to Engineering Education at Brigham Young University," Brigham Young University Press, 1991.
- J.N. Harb, R.E. Terry, P.K. Hurt and K.J. Williamson, Teaching Through the Cycle, 2nd Edition, Brigham Young University Press, 1995.
- K. Thornton, J.N. Harb, and L. Lin, "Nanotechnology for Fuel Cells and Batteries," NSF Workshop on Emerging Opportunities of Nanoscience to Energy Conversion and Storage, <http://www.cs.duke.edu/~reif/NSF.NanoEnergy/Report> (2006).

BOOK CHAPTER

- S.A. Benson, M.L. Jones, and J.N. Harb, "Ash Formation and Deposition (Chapter 4)," in Fundamentals of Coal Combustion for Clean and Efficient Use, edited by L.D. Smoot, Elsevier, 1992.

PEER-REVIEWED PUBLICATIONS

1. J. N. Harb and R. C. Alkire, "A Finite Element Model for the Dissolution of Corrosion Pits in the Presence of Fluid Flow," Int. J. Numer. Meth. Fluids, 8, (Dec. 1988).
2. J. N. Harb and R. C. Alkire, "The Effect of Fluid Flow on Growth of Single Corrosion Pits," Corros. Sci., 29, 31 (1989).
3. J. N. Harb and E. E. Smith, "Fireside Corrosion in PC-fired Boilers," Prog. Energy Combust. Sci., 16, 169, (1990).
4. J.N. Harb, W.G. Pitt, and D. Tolley, "Statistical Analysis of Neutron Burst Size and Rate During Electrolysis of LiOD Solutions," J. Fusion Technology, 18, 669, (1990).
5. J. N. Harb and R. C. Alkire, "Transport and Reaction During Pitting Corrosion of Ni in 0.5M NaCl I. Stagnant Fluid," J. Electrochem. Soc., 138, 2594 (1991).
6. R.E. Terry, J.N. Harb, D.L. Whitman, and R.A. Branting, "ERR: An Alternate Method to DCFROR for Plant Economic Analysis," AACE Cost Engineering Magazine, 33, 11 (1991).

7. J. N. Harb and R. C. Alkire, "Transport and Reaction During Pitting Corrosion of Ni in 0.5M NaCl II. Flowing Fluid," *J. Electrochem. Soc.*, 138, 3568, (1991).
8. R.E. Terry, K.J. Williamson, P.K. Hurt, and J.N. Harb, "Examples of Instructional Activities Which Will Address Different Student Learning Preferences", *Australasian J. of Eng. Ed.*, Vol. 3, (1992).
9. J.N. Harb and R.E. Terry, "A Look at Performance Evaluation Tools Through the Use of the Kolb Learning Cycle," *Proceedings of ASEE 1992 Annual Conference*, Vol. 2, 1124 (1992).
10. J.N. Harb and R.E. Terry, "Use of the Kolb Learning Cycle and the 4MAT System in Engineering Education," *J. Eng. Education*, 82, 70 (1993).
11. J.N. Harb, G.H. Richards, and C.L. Munson, "Use of Equilibrium Calculations to Predict the Behavior of Coal Ash in Combustion Systems," *Energy & Fuels*, 7, 208, (1993).
12. R.E. Terry and J.N. Harb, "Kolb, Bloom, Creativity, and Engineering Design," *Proceedings of ASEE 1993 Annual Conference*, Vol. 2, 1594 (1993).
13. J.N. Harb, C.J. Zygarlicke, and G.H. Richards, "The Effect of Particle Composition and Temperature on the Deposition of Two Western U.S. Coals in a Laminar Drop Tube Furnace," *J. Inst. Energy*, 66, 91 (1993).
14. H. Yu, J.E. Marchek, N.L. Adair, and J.N. Harb, "Characterization of Minerals and Coal/Mineral Associations in Pulverized Coal," in The Impact of Ash Deposition on Coal Fired Plants, J. Williamson & F. Wigley, eds., Taylor & Francis, Washington DC, 1994.
15. G. H. Richards, P.N. Slater, and J. N. Harb, "Simulation of Ash Deposit Growth in a Pulverized Coal-Fired Pilot Scale Reactor," *Energy & Fuels*, 7, 774, (1993).
16. G.H. Richards, L.L. Baxter, D.K. Ottesen, and J.N. Harb, "In Situ, RealTime Characterization of Coal Ash Deposits Using Fourier Transform Infrared Emission Spectroscopy," *Energy & Fuels*, 7, 755, (1993).
17. S.A. Benson and J.N. Harb, "Fuel Minerals, Fouling, and Slagging," *Energy & Fuels*, 7, 743 (1993).
18. J.N. Harb, P.N. Slater, and G.H. Richards, "A Mathematical Model for the Build-up of Furnace Wall Deposits," in The Impact of Ash Deposition on Coal Fired Plants, J. Williamson & F. Wigley, eds., Taylor & Francis, Washington DC, 1994.
19. J.N. Harb, R.E. Terry, and J.E. Sharp, "Writing Across the Curriculum and Around the Cycle," *Proceedings of the 1994 Annual ASEE Conference*, Edmonton, Alberta, Canada, June 26-29, 1994.
20. G.H. Richards, J.N. Harb, L.L. Baxter, S. Bhattacharya, R.P. Gupta, and T.F. Wall, "Radiative Heat Transfer in Pulverized-Coal Fired Boilers - Development of the Absorptive/Reflective Character of

Initial Ash Deposits," Proceedings of the 25th Symposium (International) on Combustion, The Combustion Institute, 1995.

21. P.N. Slater, G.H. Richards, and J.N. Harb, "Pyrite and Illite Associations in two Eastern U.S. Bituminous Coals," *Fuel Processing Technology*, 44, 55 (1995).
22. T.F. Wall, S.P. Bhattacharya, L.L. Baxter, G. Richards, and J.N. Harb, "The character of ash deposits and the thermal performance of furnaces," *Fuel Processing Technology*, 44, 143 (1995).
23. G.H. Richards, J.N. Harb, and L.L. Baxter, "Investigation of Ash Deposition from Two Low-Sulfur Western U.S. Coals," in Application of Advanced Technology to Ash-Related Problems in Boilers, L.L. Baxter and R. DeSollar, eds., Plenum Press, N.Y., 1996.
24. J.E. Sharp, J.N. Harb, and R.E. Terry, "Combining Kolb Learning Styles and Writing to Learn in Engineering Classes," *J. Engineering Education*, **86**, 93 (1997).
25. J.N. Harb, A. Jones, R.L. Rowley, and W.V. Wilding, "Use of Computational Tools in Engineering Education: A Case Study on the Use of Mathcad," *Chemical Engineering Education*, **31**, 180 (1997).
26. H. Wang and J.N. Harb, "Modeling of Ash Deposition in Large-Scale Combustion Facilities Burning Pulverized Coal," *Prog. Energy Combust. Sci*, **23**, 267 (1997).
27. K.A. Solen and J.N. Harb, "An Introductory ChE Course for First-Year Students," *Chemical Engineering Education*, **32**, 52 (1998).
28. H. Wang, J. West and J.N. Harb, "Microanalytical Characterization of Slagging Deposits From a Pilot-Scale Combustor," *Energy & Fuels*, **13**, 570 (1999).
29. J.N. Harb and R.M. LaFollette, "Mathematical Model of the Discharge Behavior of a Spirally Wound Lead-Acid Cell," *J. Electrochem. Soc.*, 146, 809 (1999).
30. J.N. Harb, V.H. Johnson, and D. Rausen, "Use of a Fundamentally Based Lead-Acid Battery Model in Hybrid Vehicle Simulations," in Tutorials in Electrochemical Engineering- Mathematical Modeling, Savinell et al, eds., Proceedings Volume 99-14, Electrochemical Society, 1999.
31. W.V. Wilding, J.N. Harb, R.E. Terry, W.C. Hecker, "Maximizing the Benefit of Developing an Educational Plan to Meet the ABET 2000 Criteria," Proceedings of the 1999 Annual ASEE Conference, Charlotte, NC, June 20-23, 1999.
32. P.H. Humble, J.N. Harb and R.M. LaFollette, "Microscopic Nickel-Zinc Batteries for Use in Autonomous Microsystems ", *J. Electrochem. Soc.*, vol. 148, (2001), p. A1357.
33. J.N. Harb, R.M. LaFollette, R.H. Selfridge and L.L. Howell, "Microbatteries for Self-Sustained Hybrid Micropower Supplies," *Journal of Power Sources*, **104**, 46 (2002).

34. R.E. Terry, J.N. Harb, W.C. Hecker, and W.V. Wilding, "Definition of Student Competencies and Development of an Educational Plan to Assess Student Mastery Level," *International Journal of Engineering Education*, 18, (2002).
35. R.E. Terry, W.V. Wilding, and J.N. Harb, "A Senior Exam to Assess the Learning of Core Competencies in a Chemical Engineering Curriculum," Proceedings of the 2002 Annual ASEE Conference, Montreal, Canada, June 2002.
36. C.D. Lott, T.W. McLain, J.N. Harb, L.L. Howell, "Modeling the Thermal Behavior of a Surface-micromachined Linear-displacement Thermomechanical Microactuator," *Sensors and Actuators, A Physical*, **101**, 239 (2002).
37. M. Tan and J.N. Harb, "Additive Behavior during Copper Electrodeposition in Solutions Containing Cl⁻, PEG and SPS," *J. Electrochem. Soc.*, **150**, C420-C425 (2003).
38. P. H. Humble and J. N. Harb, "Optimization of Nickel-Zinc Microbatteries for Hybrid Powered Microsensor Systems," *J. Electrochem. Soc.*, **150**, A1182 (2003).
39. C.G. Guymon, M.L. Hunsaker, J.N. Harb, D. Henderson and R.L. Rowley, "Effects of Solvent Model Flexibility on Aqueous Electrolyte Behavior Between Electrodes," *J. Chem. Phys.*, **188**, 10195 (2003).
40. D.M. Bennett, R.H. Selfridge, J.N. Harb and D.T. Comer, "A Control Circuit for a Microsensor Hybrid Power Supply", *IEEE Transactions on Industrial Electronics*, **51**, 74 (2004).
41. Q. Lin and J.N. Harb, "Implementation of a Thick-Film Composite Li-Ion Microcathode using Carbon Nanotubes as the Conductive Filler," *J. Electrochem. Soc.*, vol. 151, A1115 (2004).
42. B. Zhang, J.N. Harb, R.C. Davis, J.W. Kim, S.H. Chu, S. Choi, T. Miller, and G.D. Watt, "Kinetic and thermodynamic characterization of the cobalt and manganese oxyhydroxide cores formed in horse spleen ferritin," *Inorg Chem.* 44(10), 3738-45 (2005).
43. H.A. Becerril, R.M. Stoltenberg, D.R. Wheeler, R.C. Davis, J.N. Harb, and A.T. Woolley, "DNA-Templated Three-Branched Nanostructures for Nanoelectronic Devices," *JACS* 127, 2828 (2005).
44. C.G. Guyman, R.L. Rowley, J.N. Harb and D.R. Wheeler, "Simulating an Electrochemical Interface Using Charge Dynamics," *Condensed Matter Physics*, 8, 335 (2005).
45. D. Xu, G.D. Watt, J.N. Harb, and R.C. Davis, "Electrical Conductivity of Ferritin Proteins by Conducting AFM," *Nano Letters* 5(4) 571 - 577, (2005).
46. Bo Zhang, John N. Harb, Robert C. Davis, Sang Choi, Jae-Woo Kim, Tim Miller, Sang-Hyon Chu, and Gerald D. Watt, "Electron Exchange between Fe(II)-Horse Spleen Ferritin and Co(III)/Mn(III) Reconstituted Horse Spleen and *Azotobacter vinelandii* Ferritins," *Biochemistry* **45** (18), 5766 - 5774, (2006).

47. I. Thorat, V. Mathur, J. Harb, and D. Wheeler, "Performance of carbon-fiber-containing LiFePO₄ cathodes for high-power applications," *J. Power Sources* **162**, 673-678 (2006).
48. Shin, K.M., Watt, G.D., Zhang, B., Harb, J.N., Harrison, R.G., Kim, S.I., & Kim, S.J. "Electrochemical analysis of the reduction of ferritin using oxidized methyl viologen," *J. Electroanal. Chem.*, **598**, 22-26 (2006).
49. M. Tan, C. Guymon, D. Wheeler, and J. N. Harb, "The role of SPS, MPSA and chloride in additive systems for copper electrodeposition," *J. Electrochem. Soc.*, **154**, D78-D81 (2007).
50. Yang, L.; Lua, Y-Yi.; Tan, M.; Scherman, O.A.; Grubbs, R.H.; Harb, J.N.; Davis, R.C.; Linford, M.R. The Chemistry of Olefin-Terminated Homogeneous and Mixed Monolayers on Scribed Silicon. *Chemistry of Materials* **19**, 1671 - 1678 (2007).
51. J.N. Harb, R.L. Rowley, S.P. Magleby and A.R. Parkinson, "Going Global: Implementation of a College-wide Initiative To Prepare Engineering and Technology Students for the 21st Century," Proceedings of the 2007 Annual ASEE Conference, AC 2007-2912, Honolulu, HI, June (2007).
52. P.H. Humble, J.N. Harb, H.D. Tolley, A.T. Woolley, P.B. Farnsworth and M.L. Lee, "Influence of Transport Properties in Electric Field Gradient Focusing," *J. Chromatography A* **1160**, 311-319 (2007).
53. J.N. Harb, S. M. Lyon, J. Larsen, L. L. Howell, and T. W. McLain, "Design Factors Influencing Power Reduction in Thermomechanical In-plane Microactuators," Proceedings of IDETC/CIE 2007 as part of the 2007 ASME International Conference on Micro- and Nanosystems (MNS), p. DETC2007-34206 (2007).
54. D.E. Stephenson, E.M. Hartman, J.N. Harb, and D.R. Wheeler, "Modeling of particle-particle interactions in porous cathodes for lithium-ion batteries," *J. Electrochem. Soc.*, **154**, A1146-A1155 (2007).
55. M. Linford, M. Lee, K. Nelson, L. Hutchins, H. Becerril, S. Cosby, J. Blood, D. Wheeler, R. Davis, A. Woolley, and J. Harb, "Nanografting of silanes on silicon dioxide with applications to DNA localization and copper electroless deposition," *Chem. Mater.*, **19**, 5052-5054 (2007).
56. C.L. Guymon, J.N. Harb, R.L. Rowley, and D.R. Wheeler, "MPSA effects on copper electrodeposition investigated by molecular dynamics simulations," *J. Chem. Phys.*, **128**, 044717 (2008).
57. A.R. Parkinson, J.N. Harb, S.P. Magleby and C. Pate, "Going Global: Implementation of a College-wide Initiative to Prepare Engineering and Technology Students for the 21st Century", Proceedings of the 2008 ASEE Annual Meeting, Pittsburgh, PA, June (2008). Recipient of Best Paper Award in the International Division.
58. I.V. Thorat, D.E. Stephenson, N.A. Zacharias, K. Zaghbi, J.N. Harb, D.R. Wheeler, "Quantifying Tortuosity in Porous Li-Ion Battery Materials," *J. Power Sources* **188**, 592-600 (2009).

59. A.R. Parkinson, J.N. Harb, S.P. Magleby, "Developing Global Competence in Engineers: What Does It Mean? What is Most Important?" Proceedings of the 2009 ASEE Annual Meeting, Austin, TX, June (2009), accepted.
60. Val Hawks, John Harb, Alan Parkinson and Spencer Magleby, "A College-wide Approach for Teaching and Developing Leadership: Model, Framework and Outcomes," Proceedings of the 2009 ASEE Annual Meeting, Austin, TX, June (2009), accepted.

OTHER PUBLICATIONS

1. J. N. Harb, "Critical Hydrodynamic Conditions for Disruption of Single Corrosion Pits on Stainless Steel," Report on Edward G. Weston Fellowship, Summer, 1985; J. Electrochem. Soc., 133, 439C (1986).
2. J. N. Harb and R. C. Alkire, "Simulation of Anodic Dissolution during Pitting Corrosion," Proceedings of FIDAP User's Conference, sponsored by Fluid Dynamics International, Evanston, IL September, 1987.
3. W.G. Pitt, J.N. Harb, and C.J. Farahmandi, "Observation of Neutrons during Electrolysis of LiOD Solutions," Proceedings of NSF Conference on Cold Fusion, October, 1989.
4. J.N. Harb, G.H. Richards, and C.L. Munson, "Theoretical Investigation of Ash Transport in a Laminar Drop Tube Furnace Including Temperature and Compositional Effects," Proceedings of the ASME Ash Deposit and Corrosion Research Committee Seminar on Fireside Fouling Problems, Brigham Young University, Provo, UT, April 46, (1990).
5. C.L. Munson, G.H. Richards, and J.N. Harb, "Use of Equilibrium Calculations to Predict the Behavior of Coal Ash in Combustion Systems," Western States Section of the Combustion Institute, La Jolla, CA, October 1516, 1990.
6. R.E. Terry, K.J. Williamson, P.K. Hurt, and J.N. Harb, "Examples of Instructional Activities Which Will Address Different Student Learning Preferences," in Proceedings of the East-West Congress on Engineering Education, Jagiellonian University, Cracow, Poland, September 1620, 1991.
7. J.N. Harb, S.O. Durrant, and R.E. Terry, "Use of the 4MAT System in Engineering Education," Proceedings of the 21st Annual Frontiers in Education Conference, L.P. Grayson, ed., p.612, Purdue, IN, September 2124, 1991.
8. J.N. Harb and H. Yu, "Characterization of Included and Excluded Minerals in Pulverized Coal," Proceedings of the Ninth Annual International Pittsburgh Coal Conference, p. 235, 1992.
9. G.H. Richards, J.N. Harb, and C.J. Zygarlicke, "The Effect of Variations in Particle-to-Particle Composition of the Formation of Ash Deposits," in Inorganic Transformations and Ash Deposition During Combustion, S.A. Benson, ed., ASME Press, NY, p. 713, 1992.

10. J.N. Harb, P.N. Slater, and J.E. Marchek, "Mineral Associations in Pulverized Coal," Preprints of papers presented at the National Meeting of the American Chemical Society, Chicago, Illinois, August, 1993.
11. T.F. Wall, L.L. Baxter, G.H. Richards, and J.N. Harb, "Ash Deposits, Coal Blends and the Thermal Performance of Furnaces," Proceedings of the Engineering Foundation Conference on Coal Blending and Switching of Western Low-Sulfur Coals, September 26 - October 1, 1993.
12. L.L. Baxter, G.H. Richards, and J.N. Harb, "Application of Advanced Technologies to Ash-Related Problems in Boilers," Sandia Report, SAND94-8761 UC-1409, January 1995.
13. P.N. Slater, N.L. Adair, M.B. Abbott, R.L. Newsom, E. Hmouz, and J.N. Harb, "Experimental Investigation of Ash Behavior During Staged-Air Combustion of Pulverized Coal," in **Coal Science**, edited by J.A. Pajares and J.M.D. Tascon, Elsevier, 1995.
14. H. Wang and J.N. Harb, "Modeling of Ash Deposition in Large-Scale Combustion Facilities Burning Pulverized Coal," Western States Section of the Combustion Institute, Stanford University, October 1995.
15. J. West and J.N. Harb, "Microanalytical Characterization of Slagging Deposits in a Pilot-Scale Combustor," Preprints of the Fuel Division of the American Chemical Society, **41**, 623 (1996).
16. P.N. Slater, M.B. Abbott, and J.N. Harb, "Algebraic Interpretation of Composition Phase Classification Criteria for CCSEM," Preprints of the Fuel Division of the American Chemical Society, **41**, 662 (1996).
17. H. Wang and J.N. Harb, "Modeling of Ash Deposit Growth and Sintering in PC-Fired Boilers," in The Impact of Mineral Impurities in Solid Fuel Combustion, L.L. Baxter, T.F. Wall and R. Gupta, eds., Kluwer Academic/Plenum Press, N.Y., p. 697, 1999.
18. L.G. Salmon, R.A. Barksdale, B. Beachem, R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble and D. Ryan, "Development of Rechargeable Microbatteries for Autonomous MEMS Applications," Proceedings of the 1998 Solid-State Sensor and Actuator Workshop, Hilton Head South Carolina, June 1998, p. 338-341.
19. L.G. Salmon, R.A. Barksdale, B. Beachem, R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble and D. Ryan, "Fabrication of Rechargeable Microbatteries for Microelectromechanical System (MEMS) Applications," Proceedings of the 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, Paper 116 (1998).
20. R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble, L.G. Salmon, R.A. Barksdale, B. Beachem and D. Ryan, "The Performance of Microscopic Batteries Developed for MEMS Applications," Proceedings of the 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, Paper 117 (1998).

21. J.N. Harb and R.M. LaFollette, "Predictions of the Thermal Behavior of a Spirally Wound Lead-Acid Battery Cell," Proceedings of the 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, Paper 291 (1998).
22. K.A. Solen and J.N. Harb, "A First-Year Course as a Foundation for Engineering Education," Proceedings of the International Conference on Engineering Education- ICEE-98, Rio de Janeiro, Brazil, August 15-20, 1998.
23. R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble, R.A. Barksdale, T. Crop, B. Anderson, L.G. Salmon, and D.M. Ryan, "Electrochemical Behavior of Microscopic Secondary Batteries," Proceedings of the 34th Intersociety Energy Conversion Engineering Conference (1999).
24. D.M. Ryan, R.M. LaFollette, and J.N. Harb, "Power Supply Concepts for Remote, Autonomous Sensors," SAE Conference, April 10, 1999, Phoenix, AZ.
25. J. N. Harb, Paul Humble L. L. Howell, T. W. McLain, S. Lyon, M. Baker, J. Wittwer, C. Lott R. H. Selfridge, D. Bennett, "Micropower For Remote, Autonomous Microsystems," Proceedings of the 2001 National Science Foundation Design, Service and Manufacturing Grantees and Research Conference, Tampa, Florida, January 2001.
26. D.M. Bennett, J. N. Harb, R.H. Selfridge, and P.H. Humble, "Hybrid Power Systems for Autonomous MEMS," *Proceedings of SPIE*, vol. 4334, (2001), p. 354.
27. C.D. Lott, T.W. McLain, J.N. Harb, L.L. Howell, "Thermal Modeling of a Surface-micromachined Linear Thermomechanical Actuator," *2001 International Conference on Modeling and Simulation of Microsystems*, March 2001, Hilton Head, South Carolina.
28. R.M. LaFollette, J.N. Harb and P.H. Humble, "Microfabricated Secondary Batteries for Remote, Autonomous, Electronic Devices", *Proceedings of the Sixteenth Annual Battery Conference on Applications and Advances*, p. 349, 2001.
29. M. Tan and J.N. Harb, "An Experimental Investigation of the Role of PEG, Cl⁻ And SPS during Copper Electrodeposition," Proceedings of the Symposium on Copper Interconnects, New Contact Metallurgies, and Low-k Interlevel Dielectrics, 202th ECS Meeting, Salt Lake City, UT, October, 2002.
30. P.H. Humble and J.N. Harb, "Optimization Of Nickel-Zinc Microbatteries For Hybrid Powered Microsensor Systems," Proceedings of the Micropower Symposium, 202th ECS Meeting, Salt Lake City, UT, October, 2002.
31. S-H. Chu, J. N. Harb, S.H. Choi, G.D. Watt, R. Davis, G.C. King, and P. Lillehei, "Conceptual Aspects of Nanopower Systems," Proceedings of 1st World Congress on Biomimetics and Artificial Muscles, Albuquerque, New Mexico (2002).
32. M. Tan and J. N. Harb, "The Role of Chloride Ion in Copper Electrodeposition from Acidic Baths" Proceedings of the Symposium on Copper Interconnects, Low-k Inter-level Dielectrics, and New

Contact Metallurgies/Structures, G. S. Mathad, H.S. Rathore, C. Reidsema-Simpson, K. Kondo, and V. Bakshi, 204th ECS Meeting, Orlando, FL, October, 2003.

33. M. Tan and J.N. Harb, "A Comparison Study of the Behavior of Cl-PEG-SPS and Cl-PEG-MPSA Additive System during Copper Electrodeposition," Symposium on Electrochemical Processing in ULSI and MEMS, H. Deligianni, S. T. Mayer, T. P. Moffat, and G. R. Stafford, Editors, 205th ECS Meeting, San Antonio, Texas, May 2004.
34. K.A. Nelson, S.T. Cosby, J.C. Blood, M.V. Lee, D.R. Wheeler, R.C. Davis, A.T. Woolley, M.R. Linford, J.N. Harb, "Substrate Preparation for Nanowire Fabrication by Selective Metallization of Patterned Silane Monolayers," *ECS Trans.* **1**, Issue 12, 17-23 (2006).
35. J. Liu, H. A. Becerril, M. V. Lee, K. A. Nelson, E. Bird, L. Hutchins, H. Conley, D. R. Wheeler, R. C. Davis, A. T. Woolley, M. R. Linford, and J. N. Harb, "Chemically Directed Surface Alignment and Wiring of Self-Assembled Nanoelectrical Circuits," Proceedings of the 5th Annual Conference on Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO08), Snowbird, UT, April (2008).

INVITED LECTURES/WORKSHOPS

1. R.E. Terry and J.N. Harb, "Teaching through the Cycle," Invited Workshop presented at the Colorado School of Mines, August, 1991.
2. R.E. Terry and J.N. Harb, "Teaching through the Cycle," Invited Workshop presented at the University of Wyoming, September 1991.
3. J.N. Harb and R.E. Terry, "Teaching through the Cycle," Invited Workshop presented at Auburn University, September 1992.
4. J.N. Harb and R.E. Terry, "Teaching through the Cycle," Invited Workshop presented at Rochester Institute of Technology, NY, April 1993.
5. R.E. Terry and J.N. Harb, "Teaching through the Cycle," Invited Workshop presented in conjunction with Annual Frontiers in Education Conference (International), Washington, D.C., November 1993.
6. J.N. Harb and R.E. Terry, "Teaching through the Cycle," Workshop presented in conjunction with the National ASEE Meeting, Anaheim, CA., June 1995.
7. J.N. Harb and R.E. Terry, "Cooperative Learning/Preparing for EC 2000," Loyola Marymount University, April 1999.
8. J.N. Harb, "Developing a Process for Program Assessment and Evaluation," University of Utah, March 2000.
9. J.N. Harb and R.M. LaFollette, "Microscopic Batteries for MEMS and Other Microsystems," IEEE Solid-State Circuits and Technology Committee (SSCTC) Workshop on Biomedical Electronics, Arlington, VA, October 2000.

10. J.N. Harb, "Microscopic Batteries for MEMS and Other Microsystems," NASA Langley Research Center, May 2001.
11. J.N. Harb and R.E. Terry, "Learning Styles and Personality Types," Invited Workshop presented at the University of Utah, Salt Lake City, Utah, August 2002.
12. J.N. Harb, L.L. Howell, and C. Petrie, "Development of a Microbattery-Based Hybrid Micropower System," Materials Research Society, Boston, MA, December 2003 (invited talk).
13. J.N. Harb, L.L. Howell and C. Petrie, "Hybrid Micropower for Microsensing Systems," Invited talk presented at the Workshop on Power Sources for Distributed Autonomous Systems, Naval Research Laboratory February 23-24, 2004.
14. J.N. Harb, "Application of Nanotechnology to Electrochemical Energy Storage," NSF Workshop on Emerging Opportunities of Nanoscience to Energy Conversion and Storage, Arlington, VA, November 21-22, 2005.
15. J.N. Harb, "Basic Research Needs for Electric Energy Storage," DOE BES Workshop Planning Meeting, Bethesda, MD, August 2006.
16. J.N. Harb, Invited Panel Member, Department of Energy BES Workshop on Basic Research Needs for Electrical Energy Storage (EES), Bethesda, MD, April 2-4, 2007.
17. J.N. Harb, "Microbatteries for Micropower Supplies," 59th Annual Meeting of the International Society of Electrochemistry, Seville, Spain; September 2008.
18. J.N. Harb, "The Influence of Current Distribution on Battery Design and Performance," 215th Meeting of the Electrochemical Society, San Francisco, CA, May 2009.

OTHER TECHNICAL PRESENTATIONS

1. J.N. Harb and R.C. Alkire, "Simulation of Anodic Dissolution during Pitting Corrosion," FIDAP User's Conference, sponsored by Fluid Dynamics Internation, Evanston, IL September 14-15, 1987.
2. J.N. Harb and R.C. Alkire, "Theoretical and Experimental Investigation of Pitting Corrosion on Nickel in Chloride Solution," Spring Meeting of the Electrochemical Society, Los Angeles, CA, May 7-12, 1989.
3. J. N. Harb, "Research in Mineral Matter Deposition at Brigham Young University," Energy and Minerals Research Center, University of North Dakota, Grand Forks, ND, June 28, 1989.
4. J.N. Harb, W.G. Pitt, D.N. Bennion, E.P. Palmer, J.B. Czirr, G.L. Jensen, and S.L. Jones, "Observation of Neutrons from Cold Nuclear Fusion," Fall Meeting of the Electrochemical Society, Hollywood, Florida, October 16-20, 1989.
5. J.N. Harb and G.H. Richards, "Simulation of Ash Deposition in a Laminar Drop-Tube Furnace," AIChE 1990 Spring National Meeting, Orlando, Florida, March 18-22, 1990.
6. J.N. Harb, G.H. Richards, and C.L. Munson, "Theoretical Investigation of Ash Transport in a Laminar DropTube Furnace Including Temperature and Compositional Effects," Proceedings of the ASME Ash Deposit and Corrosion Research Committee Seminar on Fireside Fouling Problems, Brigham Young University, Provo, UT, April 4-6, 1990.
7. J.N. Harb and R.E. Terry, "Application of the Kolb Learning Cycle to Design Instruction, " ASEE Rocky Mountain Regional Conference, Golden, Colorado, April 6, 1990.
8. C.L. Munson, G.H. Richards, and J.N. Harb, "Use of Equilibrium Calculations to Predict the Behavior of Coal Ash in Combustion Systems," Western States Section of the Combustion Institute, October 15-16, 1990, La Jolla, CA.
9. M.L. Jones and J.N. Harb, "Fouling and Slagging in Coal Combustion Systems," Annual Review Meeting of the Advanced Combustion Engineering Research Center, March 5-6, 1991, Brigham Young University, Provo, UT.
10. G.H. Richards, J.N. Harb, and C.J. Zygarlicke, "The Effect of Variations in Particle-to-Particle Composition of the Formation of Ash Deposits," Engineering Foundation Conference on Inorganic Transformations and Ash Deposition during Combustion, March 10-15, 1991, Palm Coast, FL.
11. R.E. Terry and J.N. Harb, Keynote Address (joint), Rocky Mountain Regional Section of ASEE on Teaching and Learning in a Changing World, April 18-19, 1991, Brigham Young University, Provo, UT.
12. J.N. Harb, S. Olani Durrant, and R.E. Terry, "Use of the 4MAT System in Engineering Education," Frontiers in Education 1991, Purdue University, Indiana, September 22-24, 1991.

13. J.N. Harb and G.H. Richards, "Simulation of Mineral Matter Behavior During Combustion," 8th International Pittsburgh Coal Conference, Pittsburgh, PA, October 14-18, 1991.
14. M.L. Jones and J.N. Harb, "Fouling and Slagging in Coal Combustion Systems," Annual Review Meeting of the Advanced Combustion Engineering Research Center, March 4-5, 1992, Brigham Young University, Provo, UT.
15. J.N. Harb and R.E. Terry, "A Look at Performance Evaluation Tools Through the Use of the Kolb Learning Cycle," ASEE Annual Conference, Toledo, OH, June 21-25, 1992.
16. R.E. Terry and J.N. Harb, "Teaching through the Cycle," Workshop present at Science and Technological Conference on the Freshman Year Experience, Worcester, Massachusetts, June, 1992.
17. J.N. Harb and G.H. Richards, "Simulation of Ash Deposit Growth in a Pulverized CoalFired Pilot Scale Reactor," 24th International Symposium on Combustion, Sydney, Australia, July 5-10, 1992.
18. J.N. Harb and H. Yu, "Characterization of Included and Excluded Minerals in Pulverized Coal," Ninth Annual International Pittsburgh Coal Conference, Pittsburgh, PA, October, 1992.
19. J.N. Harb, P.N. Slater, and G.H. Richards, "Simulation of Ash Deposit Growth in a Pulverized CoalFired Pilot Scale Reactor," Annual Review Meeting of the Advanced Combustion Engineering Research Center, March 3-4, 1993, Brigham Young University, Provo, UT.
20. R.E. Terry and J.N. Harb, "Kolb, Bloom, Creativity, and Engineering Design," ASEE 1993 Annual Conference, Champaign, IL, June, 1993.
21. J.N. Harb, H. Yu, J.E. Marchek, and N.L. Adair, "Characterization of Minerals and Coal/Mineral Associations in Pulverized Coal," Engineering Foundation Conference on the Impact of Ash Deposition of Coal Fired Plants, Solihull, Birmingham, UK, June 20-25, 1993.
22. J.N. Harb, P.N. Slater, and G.H. Richards, "A Mathematical Model for the Build-up of Furnace Wall Deposits," Engineering Foundation Conference on the Impact of Ash Deposition of Coal Fired Plants, Solihull, Birmingham, UK, June 20-25, 1993.
23. J.N. Harb, P.N. Slater, and J.E. Marchek, "Mineral Associations in Pulverized Coal," National Meeting of the American Chemical Society, Chicago, Illinois, August, 1993.
24. J.N. Harb and S.A. Benson, "Thrust Area 2 Research Overview," 1994 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1994.
25. L.L. Baxter, G.H. Richards, and J.N. Harb, "Dynamic Variations in Ash Deposit Composition and Properties," 1994 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1994.

26. J.N. Harb, G.H. Richards, H. Wang, B. Abott, P.N. Slater, J.E. Marchek, S. Pal, P. Stearns, S. White, "Behavior of Mineral Matter in Combustion Systems," Poster presented at the 1994 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1994.
27. J.N. Harb, P.N. Slater, N.L. Adair, J. Widener, "Mineral Matter Transformations and Ash Deposition During Staged Combustion," Poster presented at the 1994 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1994.
28. J.N. Harb, R.E. Terry, and J.E. Sharp, "Writing Across the Curriculum and Around the Cycle," 1994 Annual ASEE Conference, Edmonton, Alberta, Canada, June 26-29, 1994.
29. G.H. Richards, J.N. Harb, L.L. Baxter, S. Bhattacharya, R.P. Gupta, and T.F. Wall, "Radiative Heat Transfer in Pulverized-Coal Fired Boilers - Development of the Absorptive/Reflective Character of Initial Ash Deposits," Presented at the 25th Symposium (International) on Combustion, The Combustion Institute, Irvine, CA, August, 1994.
30. J.N. Harb, G.H. Richards and L.L. Baxter, "Investigation of Mechanisms for the Formation of Fly Ash and Ash Deposits from Two Low-Sulfur Western Coals," AIChE Annual Meeting, San Francisco, November 1994.
31. G.H. Richards, J.N. Harb and L.L. Baxter, "Ash Formation and Deposition from Two Low-Sulfur Western Coals" 1995 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, April, 1995.
32. J.N. Harb, G.H. Richards, H. Wang, B. Abott, P.N. Slater and Rachel Newsom, "Behavior of Mineral Matter in Combustion Systems," Poster presented at the 1995 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, April, 1995.
33. J.N. Harb, P.N. Slater, N.L. Adair and Eyas Hmouz, "Mineral Matter Transformations and Ash Deposition During Staged Combustion," Poster presented at the 1995 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, April, 1995.
34. J.N. Harb, "Mineral Transformations and Ash Deposition During Staged Combustion," Annual DOE-UCR Contractors Meeting, Nashville, TN., June 1995
35. G.H. Richards, J.N. Harb and L.L. Baxter, "Ash Formation and Deposition from Two Low-Sulfur Western Coals," Engineering Foundation Conference on Application of Advanced Technologies to Ash-Related Problems in Boilers, Waterville Valley, Hew Hampshire, July 1995.
36. P.N. Slater, N.L. Adair, M.B. Abbott, R.L. Newsom and J.N. Harb, "*Experimental Investigation of Mineral Mixing Effects During Staged Combustion of Pulverized Coal*," 8th International Conference on Coal Science, Oviedo, Spain, September 1995.
37. J. West and J.N. Harb, "Microanalytical Characterization of Slagging Deposits in a Pilot-Scale Combustor," 211th ACS National Meeting, New Orleans, LA, March 24-28, 1996.

38. P.N. Slater, M.B. Abbott, and J.N. Harb, "Algebraic Interpretation of Composition Phase Classification Criteria for CCSEM," 211th ACS National Meeting, New Orleans, LA, March 24-28, 1996.
39. J.N. Harb, A. Jones, R.L. Rowley and W.V. Wilding, "Use of Computational Tools in Engineering Education- A Case Study on the Use of MATHCAD at Brigham Young University," 1996 Annual ASEE Conference, Washington D.C., June, 1996.
40. K.A. Solen and J.N. Harb, "Choices and Foundations- An Introduction to Chemical Engineering for College Freshmen," National Meeting of the American Institute of Chemical Engineers, Chicago, IL, November 1996.
41. J.N. Harb, "Investigation and Modeling of Ash Behavior in Systems Burning Pulverized Coal," 1997 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1997.
42. J.N. Harb and H. Wang, "Behavior of Mineral Matter in Combustion Systems," Poster presented at the 1997 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1997.
43. J.N. Harb, P.N. Slater, N.L. Adair and Eyas Hmouz, "Mineral Matter Transformations and Ash Deposition During Staged Combustion," Poster presented at the 1997 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1997.
44. J.N. Harb and K.A. Solen, "Choices and Foundations: An Introduction to Chemical Engineering for First-Year Students," Presented at the ASEE National Meeting, Milwaukee, WI, June 1997.
45. J.N. Harb, "Learning and Teaching with Style: Learning Styles in Engineering Education," Presented at the ASEE National Meeting, Milwaukee, WI, June 1997.
46. J.N. Harb and R.M. LaFollette, "Mathematical Model of a Spirally-Wound Lead-Acid Battery Cell," Poster presented at the International Meeting of the Electrochemical Society, Paris, France, August 1997.
47. J.N. Harb and R.M. LaFollette, "Advanced Lead-Acid Battery Development- Task 1: Modeling," Final Report presented to the GM Hybrid Vehicle Group, National Renewable Energy Laboratory, September, 1997.
48. H. Wang and J.N. Harb, "Modeling of Ash Deposit Growth and Sintering in PC-Fired Boilers," Presented at the Engineering Foundation Conference on the Impact of Mineral Impurities on Solid Fuel Combustion," Kona, Hawaii, 2-7 November, 1997.
49. J.N. Harb and H. Wang, "Behavior of Mineral Matter in Combustion Systems," Poster presented at the 1998 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1998.

50. J.N. Harb, "Modeling of Ash Deposition in Large-Scale Combustion Facilities," Presentation given at the 1998 Annual Conference, Advanced Combustion Engineering Research Center, Provo, UT, March, 1998.
51. L.G. Salmon, R.A. Barksdale, B. Beachem, R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble and D. Ryan, "Development of Rechargeable Microbatteries for Autonomous MEMS Applications," Proceedings of the 1998 Solid-State Sensor and Actuator Workshop, Hilton Head South Carolina, June 1998, p. 338-341.
52. J.N. Harb, L.G. Salmon, R.A. Barksdale, B. Beachem, R.M. LaFollette, J.D. Holladay, P.H. Humble and D. Ryan, "Fabrication of Rechargeable Microbatteries for Microelectromechanical System (MEMS) Applications," 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, (1998).
53. R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble, L.G. Salmon, R.A. Barksdale, B. Beachem and D. Ryan, "The Performance of Microscopic Batteries Developed for MEMS Applications," 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, (1998).
54. J.N. Harb and R.M. LaFollette, "Predictions of the Thermal Behavior of a Spirally Wound Lead-Acid Battery Cell," 33rd Intersociety Energy Conversion Engineering Conference, Colorado Springs, CO, August 2-6, (1998).
55. J.N. Harb, "Development of a Lead-Acid Battery Model for Use in Hybrid Vehicle Simulations," National Renewable Energy Laboratory, August, 1998.
56. K.A. Solen and J.N. Harb, "A First-Year Course as a Foundation for Engineering Education," presented at the International Conference on Engineering Education- ICEE-98, Rio de Janeiro, Brazil, August 15-20, 1998.
57. J.N. Harb, J.D. Holladay, P.H. Humble, R.M. LaFollette, L.G. Salmon, R.A. Barksdale, B.A. Anderson, "Rechargeable Microbatteries for MEMS Applications," Abstract #69, 194th Meeting of the Electrochemical Society, Boston, MA, November 1998.
58. K.A. Solen and J.N. Harb, "A First-Year Course as a Foundation for Engineering Education (An Introductory Chemical Engineering Course as an Example)," Regional Meeting of the American Society for Engineering Education, Brigham Young University, Provo, Utah, March 1999.
59. J.N. Harb, J.D. Holladay, P.H. Humble, R.M. LaFollette, L.G. Salmon, R.A. Barksdale, B.A. Anderson, "Ni/Zn and Li-Ion Rechargeable Microbatteries for MEMS Applications," Abstract #8, 195th Meeting of the Electrochemical Society, Seattle, WA, May 1999.
60. J.N. Harb, V.H. Johnson, and D. Rausen, "Use of a Fundamentally Based Lead-Acid Battery Model in Hybrid Vehicle Simulations," Symposium on Modeling Tutorials in Electrochemical Engineering- Mathematical Modeling, 195th Meeting of the Electrochemical Society, Seattle, WA, May 1999.

61. J.N. Harb, "Development of a Lead-Acid Battery Model for Use in Hybrid Vehicle Simulations," National Renewable Energy Laboratory, Final Report, May 1999.
62. J.N. Harb, R.M. LaFollette, J.D. Holladay, P.H. Humble, L.G. Salmon, R.A. Barksdale, B.A. Anderson, "Microbatteries for MEMS Applications," DARPA/ARO Conference on Microreactors, Reston, VA, June 16-19, 1999.
63. W.V. Wilding, J.N. Harb, R.E. Terry, W.C. Hecker, "Maximizing the Benefit of Developing an Educational Plan to Meet the ABET 2000 Criteria," 1999 Annual ASEE Conference, Charlotte, NC, June 20-23, 1999.
64. R.M. LaFollette, J.N. Harb, J.D. Holladay, P.H. Humble, R.A. Barksdale, T. Crop, B. Anderson, L.G. Salmon, and D.M. Ryan, "Electrochemical Behavior of Microscopic Secondary Batteries," 34th Intersociety Energy Conversion Engineering Conference, Vancouver, British Columbia, August 1999.
65. P.H. Humble, J.N. Harb and R.M. LaFollette, "Microfabricated Nickel-Zinc Microbatteries for use with MEMS Devices," 197th Meeting of the Electrochemical Society, Toronto, Canada, May 2000.
66. J.N. Harb, L.L. Howell, and R.H. Selfridge, "Micropower for Remote, Autonomous Microsystem," XYZ on a Chip, Progress Report, Arlington, VA; May 2000.
67. J.N. Harb, W.V. Wilding and R.E. Terry, "Implementing an Education Plan to Meet the ABET 2000 Criteria", Proceedings of the 2000 ASEE Annual Conference, St. Louis, Missouri, June 18-21, 2000.
68. J. N. Harb, Paul Humble L. L. Howell, T. W. McLain, S. Lyon, M. Baker, J. Wittwer, C. Lott R. H. Selfridge, D. Bennett, "Micropower For Remote, Autonomous Microsystems," 2001 National Science Foundation Design, Service and Manufacturing Grantees and Research Conference, Tampa, Florida, January 2001.
69. R.M. LaFollette, J.N. Harb, P.H. Humble, "Microfabricated Secondary Batteries for Remote, Autonomous, Electronic Devices," Long Beach Battery Conference, Long Beach, CA, January 2001.
70. P.H. Humble, J.N. Harb, L.L. Howell, and R.H. Selfridge, "Micropower For Autonomous MEMS and Other Microsystem Applications," AIChE National Meeting, Reno, Nevada, November 2001.
71. J.N. Harb, "Micropower For Autonomous MEMS and Other Microsystem Applications," Graduate Seminar presented at the Department of Chemical Engineering, Reno, Nevada, March 2002.
72. J.N. Harb, "Micropower For Micromachines," Seminar presented to undergraduate students at the Department of Chemical Engineering, Reno, Nevada, March 2002.

73. R.E. Terry, V.W. Wilding and J.N. Harb, "A Senior Exam to Assess the Learning of Core Competencies in a Chemical Engineering Curriculum," 2002 ASEE Meeting, Montreal, Canada, June 2002.
74. M. Tan and J.N. Harb, "An Experimental Investigation Of The Role Of Peg, Cl⁻ And SPS During Copper Electrodeposition," presented at the 202nd meeting of the Electrochemical Society, Salt Lake City, UT, October 20-25, 2002.
75. P.H. Humble and J.N. Harb, "Optimization Of Nickel-Zinc Microbatteries For Hybrid Powered Microsensor Systems," presented at the 202nd meeting of the Electrochemical Society, Salt Lake City, UT, October 20-25, 2002.
76. Q. Lin and J. N. Harb, "Implementing a Thick-Film Composite Li-Ion MicroCathode using Carbon Nanotubes as a Conductive Filler," presented at the 202nd meeting of the Electrochemical Society, Salt Lake City, UT, October 20-25, 2002.
77. S.H. Choi, S-H. Chu, J. N. Harb, G.D. Watt, R. Davis, G.C. King, and P. Lillehei, "Conceptual Aspects of Nanopower Systems," presented at the 1st World Congress on Biomimetics and Artificial Muscles, Albuquerque, New Mexico December 9-11, 2002.
78. D. Xu, G. Watt, J.N. Harb, R.C. Davis, "AFM Conductivity Measurements on Ferritin Molecules," Four Corners Regional American Physical Society Meeting, Session CA, October 5, 2002.
79. M. Tan and J. N. Harb, "The Role of Chloride Ion in Copper Electrodeposition from Acidic Baths" Symposium on Copper Interconnects, Low-k Inter-level Dielectrics, and New Contact Metallurgies/Structures, G. S. Mathad, H.S. Rathore, C. Reidsema-Simpson, K. Kondo, and V. Bakshi, 204th ECS Meeting, Orlando, FL, October, 2003.
80. G. Watt, B. Zhang, T. Miller, J. Harb and S. Choi, "The Electrochemical Behavior of Nanoscale Cobalt and Iron Mineral Cores in Ferritin Protein Shells," 203rd Meeting of the Electrochemical Society, Paris, France, May 2004.
81. J.N. Harb, K.A. Solen, P.D. Miller and R.H. Swan, "Development of an Intelligent Tutor for Teaching Material Balances to First Year Students," ASEE National Meeting, Nashville, TN, June 2003.
82. S.-H. Chu, G. D. Watt, Y. Park, R. C. Davis, J. N. Harb, G. C. King, P. T. Lillehei, and S. H. Choi, "Development of Nanoscale Power System using Biological Self-Assembly Method," International Energy Conversion Engineering Conference, Portsmouth, VA, Aug. 17-21 (2003).
83. Degao Xu, Gerald D. Watt, John N. Harb, and Robert C. Davis, "Atomic Force Microscope Conductivity Measurements on Single Ferritin Molecules" APS four corners meeting, Tempe Arizona, Oct 2003.
84. M. Tan and J. N. Harb, "The Role of Chloride Ion in Copper Electrodeposition from Acidic Baths" Symposium on Copper Interconnects, Low-k Inter-level Dielectrics, and New Contact

- Metallurgies/Structures, G. S. Mathad, H.S. Rathore, C. Reidsema-Simpson, K. Kondo, and V. Bakshi, 204th ECS Meeting, Orlando, FL, October, 2003.
85. M. Tan and J.N. Harb, "A Comparison Study of the Behavior of Cl-PEG-SPS and Cl-PEG-MPSA Additive System during Copper Electrodeposition," Symposium on Copper Interconnects, Low-k Inter-level Dielectrics, and New Contact Metallurgies/Structures, 205th ECS Meeting, San Antonio, Texas, May 2004.
 86. T.D. Miller, J.N. Harb, G.D. Watt, R. Davis, D. Xu, B. Zhang and S. Choi, "Half-Cell Reactions of Iron, Cobalt, and Manganese Holoferitin on Gold Electrodes," 205th ECS Meeting, San Antonio, Texas, May 2004.
 87. Q. Lin and J.N. Harb, "A High Power Thick-Film Lithium-Ion Microbattery For Powering Autonomous Microsensor Systems," 206th ECS Meeting, Honolulu, Hawaii, October 2004.
 88. C.G. Guyman, R.L. Rowley, J.N. Harb and D.R. Wheeler, "Simulated additive behavior in a copper-deposition bath using molecular dynamics," 206th ECS Meeting, Honolulu, Hawaii, October 2004.
 89. D.R. Wheeler and J.N. Harb, "Design, Optimization, and Fabrication of Li-ion Electrodes for High-power Applications," Annual DOE BATT Review Meeting, Berkeley, CA, June 2005.
 90. K. Nelson, J. Blood, S. Cosby, M. Lee, J. Harb, D. Wheeler, M. Linford, A. Woolley and R. Davis, "Selective metallization of AFM-patterned functionalized silane monolayers," 208th Meeting of the Electrochemical Society, Los Angeles, CA, 2005.
 91. C. Guymon, J. Harb and D. Wheeler, "MPSA behavior near a copper surface through molecular simulation and experiment," 208th Meeting of the Electrochemical Society, Los Angeles, CA, 2005.
 92. V. Mathur, I. Thorat, D. Wheeler and J. Harb, "Carbon-fiber containing LiFePO₄ cathodes for high-power applications," 208th Meeting of the Electrochemical Society, Los Angeles, CA, 2005.
 93. D. Stephenson, D. Wheeler, and J. Harb, "Fundamental investigation of mixed-oxide cathodes for rapid-charge lithium-ion batteries," 209th Meeting of the Electrochemical Society, Denver, CO, 2006.
 94. D.R. Wheeler and J.N. Harb, "Design, Optimization, and Fabrication of Li-ion Electrodes for High-power Applications," Annual DOE BATT Review Meeting, Berkeley, CA, June 2006.
 95. D. Stephenson, I. Thorat, E. Hartman, J. Harb, and D. Wheeler, "Fundamental investigation of inter-particle contact in porous composite cathodes," 210th Meeting of the Electrochemical Society, Cancun, Mexico, 2006.
 96. K. Murari, Y. Zhang, M. Mollazadeh, C. Sauer, M. Stanacevic, G. Cauwenberghs, J.N. Harb, N. Thakor, "A Hybrid Microbattery/Inductive Link System for Neurochemical Sensing", Biomedical Engineering Society Annual Meeting, BMES 2006, Chicago, October 11-14, 2006.

97. Thorat, D. Stephenson, V. Mathur, B. Walker, E. Hartman, J. Harb, and D. Wheeler, "Effect of morphology and thickness on high-rate discharge performance of porous composite cathodes," 212th Meeting of the Electrochemical Society, Washington, DC, 2007.
98. Yin Zhang, Kartikeya Murari, Mohsen Mollazadeh, Nitish Thakor, John Harb, Hybrid Power Strategies to Enable Autonomous In Vivo Neurochemical Sensing, Biomedical Engineering Society Annual Meeting, BMES 2007, Los Angeles, September 26-29, 2007.
99. J.N. Harb, R.L. Rowley, S.P. Magleby and A.R. Parkinson, "Going Global: Implementation of a College-wide Initiative To Prepare Engineering and Technology Students for the 21st Century," 2007 Annual ASEE Conference, Honolulu, HI, June (2007).
100. J. Liu, K. A. Nelson, E. Bird, H. Conley, L. Hutchins, H. A. Becerril, M. V. Lee, J. C. Blood, D. R. Wheeler, R. C. Davis, A. T. Woolley, M. R. Linford, and J. N. Harb, "Chemically Templated Fabrication of Nanowires, Nanostructures and Nanodevices," Poster presented at the 2007 nanoUtah Conference, Salt Lake City, UT, November 2007.
101. J. Liu, K. A. Nelson, E. Bird, H. Conley, T. Pearson, T. Wickard, L. Hutchins, D. R. Wheeler, R. C. Davis, A. T. Woolley, M. R. Linford, and J. N. Harb, "Chemically Directed Surface Alignment and Wiring of Self-Assembled Nanoelectrical Circuits," Poster presented at the NSF Nanoscale Science and Engineering Grantee Conference, Arlington, VA, 3-6 December (2007).
102. D.R. Wheeler and J.N. Harb, "The Impact of Electrode Structure on the Processes that Limit Cathode Performance," 2008 DOE OVT Annual Merit Review, Bethesda, MD, February 25-29, 2008.
103. J.N. Harb, "Nanotechnology: Much Ado About (almost) Nothing," Utah Science Fair (presented to Secondary Science Teachers), Brigham Young University, Provo Utah, March 27, 2008.
104. J. Liu, H. A. Becerril, M. V. Lee, K. A. Nelson, E. Bird, L. Hutchins, H. Conley, D. R. Wheeler, R. C. Davis, A. T. Woolley, M. R. Linford, and J. N. Harb, "Chemically Directed Surface Alignment and Wiring of Self-Assembled Nanoelectrical Circuits," Poster presented at the 5th Annual Conference on Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO08), Snowbird, UT, April (2008).
105. Y. Zhang , Q. Lin , K. Murari , N. Thakor , J.N. Harb, "Microbatteries for use in a hybrid power system for implanted neural probes," 213th Meeting of the Electrochemical Society, Phoenix, AZ, May (2008).
106. M. Linford, M. Lee, K. Nelson, A. Woolley, D. Wheeler, R. Davis, and J. Harb, "Nanografting of silanes on silicon dioxide with applications to DNA localization and copper electroless deposition," ACS 82nd Colloid & Surface Science Symposium, NC State University, June (2008).
107. A.R. Parkinson, J.N. Harb, S.P. Magleby and C. Pate, "Going Global: Implementation of a College-wide Initiative to Prepare Engineering and Technology Students for the 21st Century," 2008 ASEE Annual Meeting, Pittsburgh, PA, June (2008).

108. I. Thorat, D. Stephenson, J. Harb, and D. Wheeler, "Understanding transport limitations in porous composite cathodes for high-rate applications," 214th Meeting of the Electrochemical Society, Honolulu, HI, October (2008).
109. A. Stux, D. Rowenhorst, D. Stephenson, J. Harb, and D. Wheeler, "Imaging and modeling for engineering the Li-ion battery electrode," 214th Meeting of the Electrochemical Society, Honolulu, HI, October (2008).
110. J. Liu, K. A. Nelson, E. Bird, J. Ashton, B. Mangold, E. Nelsen, H. Conley, T. Pearson, B. Davis, F. Rivera, R. Ochoa, E. Pound, Y. Geng, B. Cragun, T. Wickard, R. C. Davis, A. T. Woolley, M. R. Linford, D. R. Wheeler, and J. N. Harb, "Chemically Directed Surface Alignment and Wiring of Self-Assembled Nanoelectrical Circuits," Poster presented at the NSF Nanoscale Science and Engineering Grantee Conference, Arlington, VA, 3-5 December (2008).